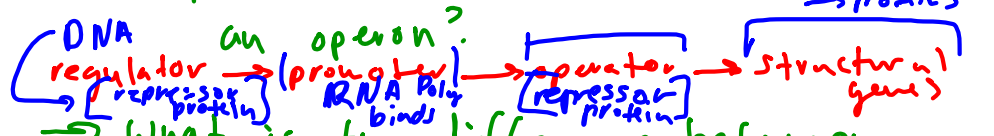


Bellringer

→ What are the parts of an "operon"?

Explain the function of each part of

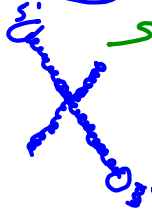


→ What is the difference between

positive control and a negative control of gene expression?



→ What are five levels of gene control in eukaryotes? Where do they occur?

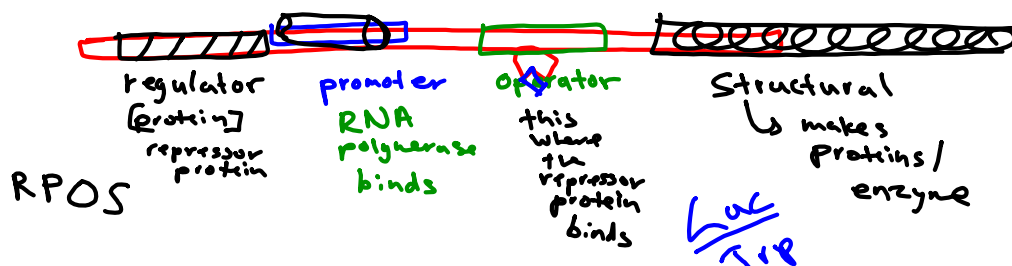


Bellringer

→ What are the 5 major ways that eukaryotic cells regulate gene expression? Describe each [strategy.] → level

- 5 levels
- Nucleus
- 1) Chromatin structure → structure (tightly wound) prevents RNA poly. attachment
 - 2) transcriptional control → TFs
 - 3) post transcriptional → RNA processing [exons]/introns
 - 4) translational control → RNA interference; siRNA; sRNA
 - 5) post translational → only functional proteins are used
- Cytoplasm/ribosome

→ What are the different parts of an operon?



Bellringer

→ If 1% of a human population has the recessive phenotype, what % of the population has the dominant phenotype, according to H-W.

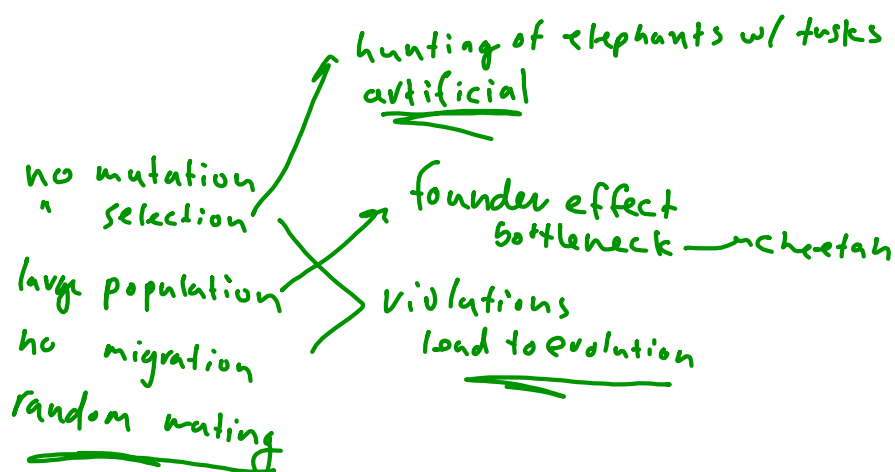
1% = .01 $\sqrt{q^2} = \sqrt{.01}$ 10 $q = .1$ $p = .9$ → 81% 1810

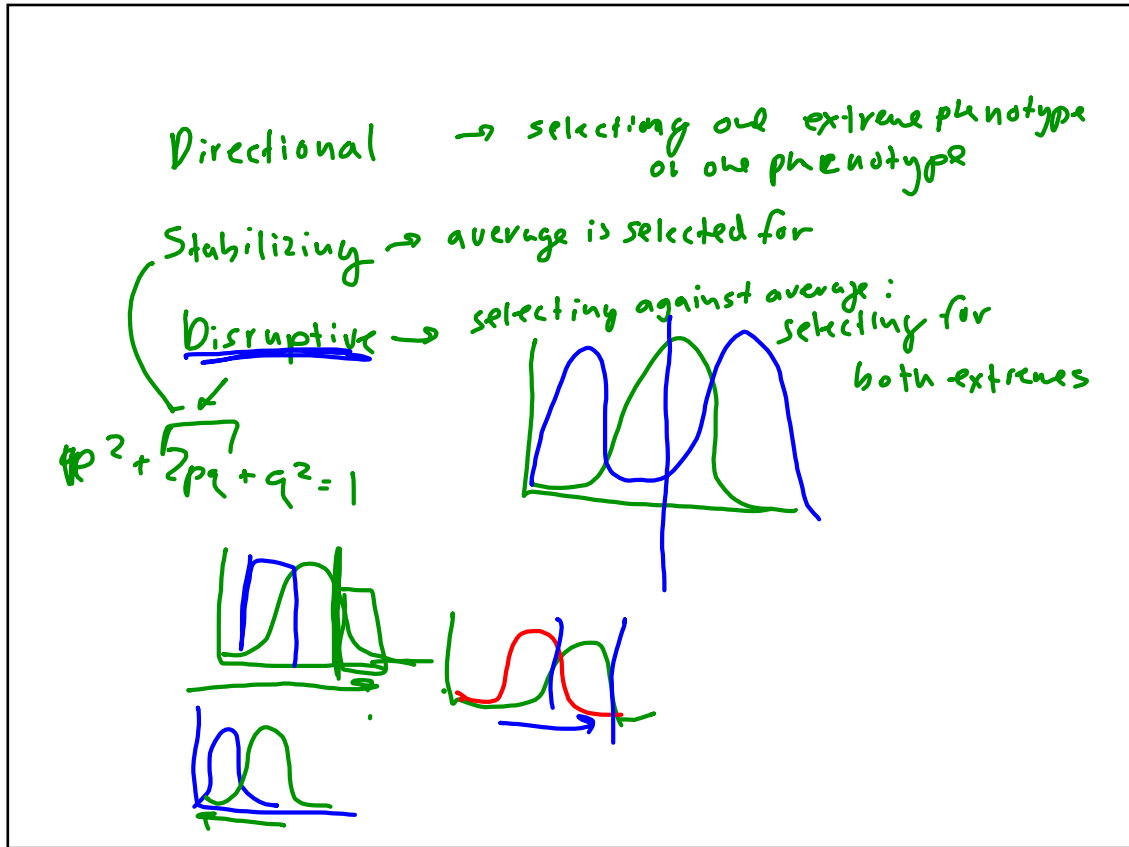
→ In a population of snails: ten had no antennae (aa), 180 were heterozygous (Aa), and 810 were homozygous dominant. What is the frequency of allele a in the population?

$p^2 + 2pq + q^2 = 1$ → $\sqrt{.01\% \text{ aa}} = \sqrt{q^2} = \sqrt{.01}$ $q = 10\%$

1000 total

.01% aa
.81% AA
.18% Aa





AP Bio Bellringer

→ What is significant about "Archaeopteryx"?

↳ transitional fossil

→ What are some of the characteristics of "Archaeopteryx" that resemble reptiles?

Birds? feather

→ pelvis
→ feet

→ Who was Darwin's "Ball dog"? Why was he given this nickname?

Huxley

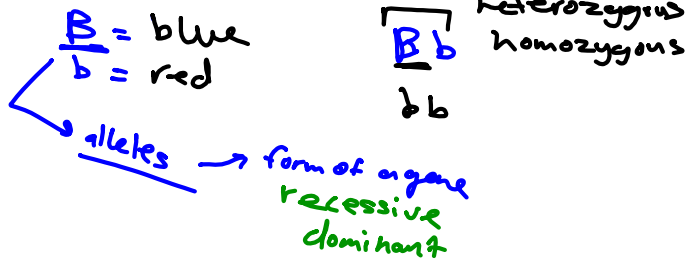
Bellringer

→ What is the difference between a genotype and a phenotype?

gene

physical expression

→ Who was Gregor Mendel? Why was he important?



B = Brown
b = tan

T = tall
t = short

$\frac{B}{b} \frac{T}{T}$

x

$\frac{b}{b} \frac{T}{t}$

$Bb \times bb$

	BT	Bt	bT	bt
BT	B ¹ B ¹ T ¹ T ¹	B ¹ B ¹ T ¹ t	B ¹ bT ¹ T ¹	B ¹ bT ¹ t
Bt	B ¹ B ¹ T ¹ t	B ¹ B ¹ tt	B ¹ bT ¹ t	B ¹ btt
bT	B ¹ bT ¹ T ¹	B ¹ bT ¹ t	bbT ¹ T ¹	bbT ¹ t
bt	B ¹ bT ¹ t	B ¹ btt	bbT ¹ t	bbtt

1:1

$B = \text{Brown}$
 $b = \text{tan}$

$T = \text{tall}$
 $t = \text{short}$

$BbTt \times BbTt$

$BbTt \times BbTt$

phenotypic ratio?

$1:1:1:1$
 $9:3:3:1$

Evidence Evolution

- 1) Fossil evidence \rightarrow transitional fossil
- 2) Biochemical RNA DNA \rightarrow Phylogeny
- 3) Anatomical structures
 - Homologous \rightarrow common ancestor
 - Analogous \rightarrow no common ancestor
 - Vestigial structure - whale walking hip bones
 - Convergent evolution
- 4) Biogeography \rightarrow Pangaea
- 5) Embryo development

Hardy - Weinberg

occurs when no evolution is occurring

$\overset{\text{allele}}{\underbrace{A \quad a}} \rightarrow \overset{\text{dominant allele}}{P} + \overset{\text{recessive allele}}{q} = 1$

$p^2 + 2pq + q^2 = 1$

1. no mutation
2. no migration
3. large population
4. no selection
5. random mating

violations
= evolution

$D \quad d \rightarrow \text{change in genotype}$

80% D

20% d

$p^2 = (.8)^2 \rightarrow .64$

$2pq = 2(.8)(.2) \rightarrow .32$

$q^2 = (.2)^2 \rightarrow .04$

1

Beltringer

non-coding

→ What are "introns" + "exons" in mRNA?

DNA → mRNA [pre mRNA] removes introns spliceosome


→ What is DNA methylation?

CH_3 → bond DNA prevents RNA polymerase → cytoplasm/ribosome


→ Describe how negative and positive control of gene regulation work.

TIP

stops polymerase in presence of substrate



Lac (AMP (cup)) +



turns on allows RNA polymerase to bind

Gene Regulation Review

Grade: 12th

Subject: AP Biology

Date:

1 Which of the following illustrates negative control?

- ☒ A a repressor that becomes active wehn bound to a corepressor and inhibits transcription
- B A gene that binds a repressor and becomes active
- C An activator that becomes active when bound to a coactivator and activates transcription
- D A repressor that binds a gene and becomes inactive

2 In regulation of the lac operon, when lactose is present and glucose is absent,...

- A the repressor is able to bind to the operator
- ☒ B the repressor is unable to bind to the operator
- ☒ C transcription of structural genes occurs
- D transcription of lactose occurs
- E both b and c.

3 In the regulation of the trp operon, when tryptophan is present, ...

- ☒ A the repressor is able to bind to the operator
- B the repressor is unable to bind to the operator
- C transcription of the repressor is inhibited
- D transcription of the structural genes, operator, and promoter occurs

4 In operon models, the function of the promoter is to ...

- A code for the repressor protein
- ☒ B bind with RNA polymerase
- C bind to the repressor
- D code for the regulator gene

5 Which of the following statements is true regarding operons?

- A the regulator gene is transcribed with the structural genes
- B the structural genes are always transcribed
- C all genes are always transcribed
- ☒ D the regulator gene has its own promoter

RPOS
G

6 Which of the following regulate gene expression in the eukaryotic nucleus?

- A postranslational control
- B transcriptional control
- C translational control
- D postranscriptional control
- ☒ E both b and d

7 Which of the following mechanisms may create multiple mRNAs from the same gene?

- A postranslational control
- ☒ B alternative mRNA splicing
- C binding of a transcription factor
- D chromatin remodeling
- E miRNAs

8 Translational control of gene expression occurs within the...

- A nucleus
- ☒ B cytoplasm
- C nucleolus
- D mitochondria

9 Alternative mRNA splicing is an example of which type of regulation of gene expression?

- A transcriptional
- ☒ B postranscriptional
- C translational
- D posttranslational

10 A scientist adds radioactive uridine (label for RNA) to a culture of cells and examines an autoradiograph. Which type of chromatin is apt to show the label?

- A heterochromatin
- ☒ B euchromatin
- C the histones, not the DNA
- D the DNA, not the histones
- E both a and d

11 Barr bodies are...

- A genetically active X chromosomes in males
- ☒ B genetically inactive X chromosomes in females
- C genetically active Y chromosomes in males
- D genetically inactive Y chromosomes in females

12 Which of these might cause a proto-oncogene to become an oncogene?

- A exposure of the cell to radiation
- B exposure of the cell to certain chemicals
- C viral infection of the cell
- D exposure of the cell to pollutants
- E all of the above

13 A cell is cancerous. You might find an abnormality in...

- A a proto-oncogene
- B a tumor suppressor gene
- C regulation of the cell cycle
- D tumor cells
- E all of these are correct

14 A tumor suppressor gene...

- A inhibits cell division
- B opposes oncogenes
- C prevents cancer
- D is subject to mutations
- E all of these are correct

15 If the DNA codons are CAT CAT CAT , and a guanine base is added at the beginning, which would result?

- A CAT CAT CAT G
- B G CAT CAT CAT
- C GCA TCA TCA T
- D GC ATC ATC AT

16 A mutation in a DNA molecule involving the replacement of one nucleotide base pair with another is called a(n)

- A frameshift mutation
- B transposon
- C deletion mutaton
- D point mutation
- E insertion mutation